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Research report

Posttraumatic growth in Veterans of Operations Enduring Freedom and Iraqi Freedom

Robert H. Pietrzak [a,b,*], Marc B. Goldstein [c], James C. Malley [d], Alison J. Rivers [a,b], Douglas C. Johnson [e], Charles A. Morgan III [a,b], Steven M. Southwick [a,b]

[a] National Center for Posttraumatic Stress Disorder, Resilience Laboratory, VA Connecticut Healthcare System, West Haven, CT, USA
[b] Department of Psychiatry, Yale University School of Medicine, New Haven, CT, USA
[c] Department of Psychology, Central Connecticut State University, New Britain, CT, USA
[d] Department of Counseling and Family Therapy, Central Connecticut State University, New Britain, CT, USA
[e] Naval Health Research Center and Department of Psychiatry, University of California San Diego School of Medicine, San Diego, CA, USA

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ABSTRACT

Objective: A growing body of research has examined the prevalence and correlates of psychopathology, mild traumatic brain injury, and related problems in Veterans of Operations Enduring Freedom and Iraqi Freedom (OEF-OIF). While these studies help characterize the deleterious effects of combat, no known study has examined factors that may enhance posttraumatic growth or positive changes experienced as a result of combat in this population.
Method: A total of 272 predominantly older Reservist/National Guard OEF-OIF Veterans completed an anonymous mail survey that assessed combat exposure, psychopathology, psychosocial functioning, social support, and posttraumatic growth.
Results: Seventy-two percent of the sample endorsed a significant degree of posttraumatic growth in at least one of the areas assessed, the most common of which were changing priorities about what is important in life (52.2%), being able to better appreciate each day (51.1%), and being better able to handle difficulties (48.5%). Hierarchical regression analysis revealed that younger age, greater posttraumatic stress disorder (PTSD) symptoms, and increased perceptions of unit member support and effort/perseverance were significantly associated with posttraumatic growth. Respondents with PTSD scored higher on an overall measure of posttraumatic growth and on items reflecting appreciation of life and personal strength.
Limitations: This study is limited by a relatively low survey return rate and employment of an abbreviated measure of posttraumatic growth.
Conclusions: Results of this study suggest that interventions to bolster unit member support and to enhance perceptions of effort and perseverance may help promote posttraumatic growth in OEF-OIF Veterans.

Epidemiologic studies suggest that about 1 in 6 Veterans of Operations Enduring Freedom and Iraqi Freedom (OEF/OIF) meet screening criteria for posttraumatic stress disorder (PTSD), depression, or related psychiatric disorders following deployment (Hoge et al., 2004, 2007; Milliken et al., 2007; Tanielian and Jaycox, 2008), and an increasing number of studies have sought to understand conditions unique to these Operations, such as blast-related mild traumatic brain injury (Brenner et al., 2009; Elder and Cristian, 2009).

While these studies provide a comprehensive characterization of the deleterious effects of combat in OEF-OIF Veterans, no known study has examined the possibility that military experience may have a positive psychological impact in this

* Corresponding author. Department of Psychiatry, Yale University School of Medicine, 950 Campbell Avenue/151E, West Haven, CT 06516, USA. Tel.: +1 860 638 7467; fax: +1 203 937 3481.
E-mail address: robert.pietrzak@yale.edu (R.H. Pietrzak).

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population. Posttraumatic growth (PTG) refers to the development of positive changes and outlook following trauma, including increased personal strength, identification of new possibilities, increased appreciation of life, improved relationships with others, and positive spiritual changes (Tedeschi and Calhoun, 1996; 2004). PTG has been observed in various trauma-exposed civilian populations, including survivors of serious medical illnesses (e.g., cancer, HIV/AIDS), rape, and disasters, as well as bereaved individuals (Tedeschi and Calhoun, 1996; Linley and Joseph, 2004; Zoellner and Maercker, 2006) and individuals who endured military combat (Aldwin et al., 1994; Feder et al., 2008).

Surprisingly few studies have examined factors associated with PTG in Veterans, and none, to our knowledge, have examined them in OEF-OIF Veterans. In one of the first studies of combat-related growth, Elder and Clipp (1989) found that, in addition to pathogenic effects, combat exposure had positive developmental effects, including learning to cope with adversity, greater self-discipline, and a broader perspective on life, in a sample of 149 World War II and Korean War Veterans. Similarly, desirable effects of military service, which correlated positively with combat exposure, were more common than undesirable effects in 1287 older World War II and Korean War Veterans (Aldwin et al., 1994). Desirable effects in this study included enhanced coping skills, greater self-esteem, and an increased sense of independence and self-discipline. More recent studies have employed a formal measure of PTG (Posttraumatic Growth Inventory; Tedeschi and Calhoun, 1996). These studies have found a moderate degree of PTG, particularly greater appreciation of life and personal strength in 30 former Vietnam prisoners of war (POWs; Feder et al., 2008); that PTSD symptoms were positively associated with PTG in 103 former Israeli POWs (Solomon and Dekel, 2007); and that social acknowledgement as a survivor and the belief that the world is meaningful was associated with greater PTG in 103 former German child soldiers of World War II (Forstmeier et al., 2009). No study, to our knowledge, has examined the prevalence and correlates of PTG in Veterans of the current conflicts in Iraq and Afghanistan. Given elevated rates of psychopathology (Hoge et al., 2004, 2007; Milliken et al., 2007) and suicidality (Kang and Bullman, 2008) in this population, identification of factors associated with PTG may help promote reintegration into civilian life and improve psychosocial functioning following deployment.

Several psychological/cognitive and social factors are associated with PTG. Psychological/cognitive factors associated with PTG include increased PTSD symptoms (Park et al., 1996; Snape, 1997; Schorr and Roemer, 2002; Levine et al., 2009); bravery, fortitude, and perseverance (Peterson et al., 2008); and optimism, extraversion, sense of coherence, positive reappraisal, and problem-focused coping (Linley and Joseph, 2004; Helgeson et al., 2006; Forstmeier et al., 2009; McCaslin et al., 2009; Levine et al., 2009). Social factors associated with PTG include increased perceptions of social support (Cadell et al., 2003; Dirik and Karanci, 2008; Rosenbach and Renneberg, 2008; Forstmeier et al., 2009; Schroevers et al., 2010; Swickert and Hittner, 2009), and spirituality and religious coping (Calhoun et al., 2000; Linley and Joseph, 2004).

The purpose of the present study was to examine the prevalence and correlates of PTG in a sample of predominantly white Reservist/National Guard OEF-OIF Veterans. A secondary aim was to examine dimensions of PTG associated with PTSD. Based on previous studies (e.g., Park et al., 1996; Snape, 1997; Feder et al., 2008; Peterson et al., 2008; Levine et al., 2009), we hypothesized that increased PTSD symptoms, and perceptions of social support and aspects of psychological resilience such as effort/perseverance would be positively associated with PTG, and that respondents with PTSD would report greater PTG, particularly on measures of appreciation of life and personal strength.

1. Method

1.1. Sample

Participants were 272 OEF/OIF Veterans from Connecticut who completed the Connecticut OEF/OIF Veterans Needs Assessment Survey (dates of service: 01/03 to 03/07). This survey was developed to identify salient needs of OEF/OIF Veterans in Connecticut and provide recommendations for legislative and public policy initiatives to improve readjustment to civilian life. The target population was all Connecticut Veterans who served in OIF/OEF since 2003. Potential respondents were identified by inspection of copies of discharge papers (DD-214s) that were sent to the Commissioner of Veterans' Affairs for the state. Her staff identified eligible Veterans and selected the first 1050 for the target sample. Surveys were anonymous and no identifying information was available to the authors. A total of 1050 surveys were mailed and 272 were returned (25.9% return rate); despite this relatively low return rate, demographic, deployment, and clinical characteristics were comparable to a nationally representative sample of OEF/OIF Veterans (Tanielian and Jaycox, 2008), though respondents to the current survey were older and consisted of more white Reservist/National Guard Veterans. On average, surveys were completed $26.9 \pm .7$ months following return from their last deployment. Institutional review boards of Yale University, Central Connecticut State University, and the VA Connecticut Healthcare System approved the study.

1.2. Assessment instruments

The Posttraumatic Growth Inventory (PTGI; Tedeschi and Calhoun, 1996) assesses positive changes reported by people who have experienced a traumatic event. An abbreviated, six-item version of this instrument was administered. These items were selected to reflect the factors that comprise the PTGI: New Possibilities; Relating to Others; Personal Strength; Appreciation of Life; and Spiritual Change. Items were rated on a 6-point Likert-type scale ranging from "0" (*I did not experience this change as a result of my deployment*) to "5" (*I experienced this change to a very great degree as a result of my deployment*). Factor analysis revealed that all six items loaded on a single factor (eigenvalue = 3.61), with item loadings ranging from .55 to .87. Cronbach's α in the current sample was .86, which is consistent with the α value of .90 reported in the initial validation of this instrument (Tedeschi and Calhoun, 1996).

The Combat Experiences Scale (CES) is a 15-item self-report instrument from the Deployment Risk and Resilience Inventory (DRRI; King et al., 2006; Vogt et al., 2008) that assesses exposure to combat, such as firing a weapon, being fired on by enemy or friendly fire and witnessing injury and death. Higher scores indicate greater combat exposure. Cronbach's α on CES items was .93.

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Posttraumatic Stress Disorder Checklist—Military Version (PCL-M; Weathers et al., 1991). The PCL-M is a 17-item screening instrument based on DSM-IV criteria for PTSD. Scores on this instrument range from 17 to 85. PTSD was identified by a total PCL-M score of ≥50 and endorsement of each of three DSM-IV criteria required for a diagnosis of PTSD. Cronbach's α on PCL-M items was .96.

The Psychosocial Difficulties Scale (PDS) is a 23-item questionnaire developed by two of the authors (M. B. G. and J. C. M.) that assesses psychosocial functioning in family and peer relationships (e.g., "have difficulty connecting emotionally with family and/or friends"), and work, school, and financial functioning (e.g., "have difficulty finding employment;" and "have difficulty paying bills)." Ratings are "Not a concern," "A slight concern," "A moderate concern," and "A major concern." Higher scores indicate greater psychosocial difficulties. Cronbach's α on PDS items was .89.

The Connor-Davidson Resilience Scale (CD-RISC; Connor and Davidson, 2003) is a 25-item self-report assessment of psychological resilience. Items are scored on a 5-point range: "0" for "Not true at all;" "1" for "Rarely true;" "2" for "Sometimes true;" "3" for "Often true;" and "4" for "True nearly all of the time." Total scores range from 0 to 100. Factor analysis in the current sample revealed a five-factor solution (Pietrzak et al., in press): (1) hardiness (e.g., "I can deal with whatever comes my way"); (2) purpose/control (e.g., "I feel in control of my life"); (3) leadership (e.g., "I prefer to take the lead in solving problems, rather than letting others make all the decisions"); (4) effort/perseverance (e.g., "I give my best effort no matter what the outcome may be"); and (5) spiritual (e.g., "Fate or God can help"). In this sample, Cronbach's α on CD-RISC items was .94.

The Unit Support Scale (USS) is a 12-item self-report instrument from the DRRI (King et al., 2006; Vogt et al., 2008) that assesses the amount of assistance and encouragement in the war zone from unit leaders and members, and the military in general. Factor analysis in the current sample revealed a three-factor solution (Pietrzak et al., in press): (1) unit member support (e.g., "My unit felt like a family"); (2) leader support (e.g., "My superiors treated me as a person"); and (3) military support (e.g., "Military appreciated my service"). Cronbach's α on USS items was .93.

The Postdeployment Social Support Scale (PSSS) is a 15-item self-report measure from the DRRI (King et al., 2006; Vogt et al., 2008) that assesses postdeployment emotional support and instrumental assistance provided by family, friends, coworkers, employers, and community. Factor analysis in the current sample revealed a four-factor solution (Pietrzak et al., in press): (1) community support (e.g., "I feel proud to be in the armed services"); (2) instrumental support (e.g., "My family and/or friends would lend me money if I needed it"); (3) accessibility of family and friends ("I have people I can talk to about my deployment"); and (4) understanding (e.g., reverse scoring of statements such as the following: "People at home do not understand what I have been through"). Cronbach's α on PSSS items was .82.

1.3. Data analysis

Logarithmic base 10 transformations were used to transform non-normally distributed continuous variables (e.g., PCL-M scores) prior to analysis. Overall prevalence of PTG was operationalized as endorsement of "4" or "5" (*great* or *very great* degree of change on any of the six items. Pearson correlations were computed to examine bivariate associations between PTG and dependent variables. Variables associated with PTG were then entered into a hierarchical linear regression analysis in a theory-driven manner. Demographic variables were entered in Step 1; risk variables in Step 2; and protective variables in Step 3. PTG scores by PTSD status were compared using multivariate analysis of covariance (MANCOVA); age was entered as a covariate in this analysis, as respondents with PTSD were younger than those without PTSD (31.1 vs. 34.0 years; Pietrzak et al., 2009).

2. Results

A total 72% of the sample reported *great* or *very great* growth on one or more of the PTGI items administered. Prevalances of *great* or *very great* growth on each item are shown in the top panel of Table 1. Total PTG scores correlated negatively with age ($r=-.26$, $p<.001$), and positively with combat exposure ($r=.13$, $p=.04$), PTSD symptoms ($r=.29$, $p<.001$), psychosocial difficulties ($r=.29$, $p<.001$) and scores on the unit member support subscale of the USS ($r=.29$, $p<.001$), understanding subscale of the PSSS ($r=.26$, $p<.001$), and effort/perseverance subscale of the CD-RISC ($r=.14$, $p=.04$). None of the other correlations between PTG and demographic, deployment, resilience, and social support measures were significant (all r's ≤.09, all p's ≥.17).

The bottom panel of Table 1 shows results of a hierarchical regression analysis that examined predictors of total PTG scores. Younger age, higher PTSD symptoms, and higher scores on measures of unit member support and effort/perseverance were positively associated with total PTG scores.

Table 2 shows PTG scores by PTSD status. Respondents with PTSD scored higher than respondents without PTSD on the total PTG score, as well as on items reflecting changing priorities in life and increased feelings of self-reliance (medium effect sizes); the groups did not differ on the other items.

3. Discussion

This study examined the prevalence and correlates of posttraumatic growth (PTG) and the relationship between PTSD and PTG in a sample of OEF-OIF Veterans. Seventy-two percent of the sample reported significant growth in at least one of the areas assessed. Given that the survey was administered 2 years following return from deployment, the positive changes reported likely reflect long-term and stable aspects of PTG. Younger age, increased PTSD symptoms, and greater perceptions of unit member support and effort/perseverance predicted greater PTG. Veterans with PTSD scored higher on an overall measure of PTG, as well as on items reflecting changing priorities about what is important in life and self-reliance.

Results of the current study replicate and extend a burgeoning body of research on PTG in a variety of trauma-exposed populations (Linley and Joseph, 2004; Zoellner and Maercker, 2006), including older World War II and Korean War Veterans (Elder and Clipp, 1989; Aldwin et al., 1994), former child soldiers of World War II (Forstmeier et al., 2009), former POWs (e.g., Solomon and Dekel, 2007; Feder et al., 2008), refugees (e.g.,

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Table 1
Prevalence of posttraumatic growth and predictors of total posttraumatic growth scores in the full sample ($n = 272$).

Endorsement of *great* or *very great* posttraumatic growth	*N*	%
Any posttraumatic growth	195	71.7%
I changed my priorities about what is important in life	142	52.2%
I can better appreciate each day	139	51.1%
I know better that I can handle difficulties	132	48.5%
I have a greater feeling of self-reliance	112	41.2%
I am better able to accept the way things work out	107	39.3%
I have a stronger religious faith	45	16.5%

Predictors of total posttraumatic growth scores

	F	*P*	*B*	*T*	*P*
Step 1; $R^2 = .06$	16.51	<.001			
Age *			−.16	2.66	.008
Step 2; $R^2 = .13$ $p < .001$	8.67				
Combat exposure			−.10	1.60	.11
PTSD symptoms *			.27	3.10	.002
Psychosocial difficulties			.12	1.63	.11
Step 3; $R^2 = .23$	10.12	<.001			
Unit member support *			.19	3.08	.002
Effort/perseverance *			.18	3.07	.002
Understanding			.09	1.38	.17

* Significant predictor of posttraumatic growth scores, $p < .01$.

Powell et al., 2003), and cancer patients (e.g., Schroevers et al., 2010). While the finding that younger age and increased PTSD symptoms were associated with PTG is consistent with previous research (Cadell et al., 2003; Powell et al., 2003; Solomon and Dekel, 2007; Park et al., 1996; Snape, 1997; Schorr and Roemer, 2002; Park et al., 2008; Dekel and Nuttman-Shwartz, 2009; Levine et al., 2009), it has not been systematically observed across studies (see review by Zoellner and Maercker, 2006). One explanation for the positive association between PTSD symptoms and PTG is that PTG occurs when the trauma has been upsetting enough to promote engagement in positive meaning-making of the event (Tedeschi and Calhoun, 1996, 2004; Levine et al., 2009). Thus, trauma survivors with lower levels of exposure (Fontana and Rosenheck, 1998) and/or PTSD symptoms (Levine et al., 2009) may be less likely to report PTG. Inconsistent associations between PTSD symptoms and PTG across studies may be accounted for by PTSD and PTG reflecting unrelated dimensions of experience; a third variable (e.g., personality traits; coping skills) mediating this association; a cognitive bias that reflects unrealistically optimistic beliefs in individuals with elevated PTSD symptoms; and/or biased measurement related to the employment of non-standardized and less reliable measures of PTG (Zoellner and Maercker, 2006).

Table 2
Posttraumatic growth scores by PTSD status.

	No PTSD	PTSD	*F*	*p*	*d*
Total posttraumatic growth score *	15.9 (.5)	18.3 (1.0)	4.24	.041	.30
I changed my priorities about what is important in life *	3.2 (.1)	4.1 (.2)	18.05	<.001	.61
I have a greater feeling of self-reliance *	2.7 (.1)	3.6 (.2)	14.43	<.001	.55
I can better appreciate each day	3.2 (.1)	2.8 (.2)	2.89	.09	.23
I am better able to accept the way things work out	2.7 (.1)	2.9 (.2)	.31	.58	.12
I know better that I can handle difficulties	2.8 (.1)	3.0 (.2)	.55	.46	.11
I have a stronger religious faith	1.5 (.1)	1.6 (.2)	.10	.75	.06

* Groups differ, $p < .05$. Scores are adjusted for age.

Greater perceptions of unit member support and effort/perseverance following trauma were also positively associated with PTG, even after controlling for age, combat exposure, PTSD symptom severity, and psychosocial difficulties. Previous research has similarly noted that social support is positively associated with PTG (Cadell et al., 2003; Bellizzi and Blank, 2006; Dirik and Karanci, 2008; Rosenbach and Renneberg, 2008; Forstmeier et al., 2009; Schroevers et al., 2010; Swickert and Hittner, 2009), and that social support is positively associated with coping self-efficacy (Cieslak et al., 2009). Social support may promote PTG by providing a context within which to construct narratives about a traumatic experience, reintegrate them into existing schemas, and generate meaning from them (Tedeschi and Calhoun, 2004). Emerging research has begun to examine specific aspects of social support associated with PTG. For example, a study of cancer survivors found that emotional support from family and friends, but not perceived availability or satisfaction with received emotional support was associated with PTG (Schroevers et al., 2010). Results of the current study extend this finding to suggest that, in OEF-OIF Veterans, greater perceptions of received unit member support, but not other aspects of social support such as leader support or postdeployment social support, were associated with PTG. This finding suggests that efforts to bolster unit member support and camaraderie may help to promote positive changes following military deployment.

Effort/perseverance was also positively associated with PTG. Increased effort and perseverance may help promote PTG by enhancing coping self-efficacy and promoting active coping (Park et al., 2008; Rosenbach and Renneberg, 2008; Cieslak et al., 2009). For example, positive reinterpretation, problem solving, sense of coherence, and active coping are positively associated with PTG in a variety of trauma-exposed samples (Widows et al., 2005; Dirik and Karanci, 2008; Forstmeier et al., 2009; Gangstad et al., 2009). Character strengths such as fortitude, perseverance, and bravery have also been linked to PTG, suggesting that growth following trauma may entail the strengthening of character (Peterson et al., 2008). Alternatively, individuals with resilient personality characteristics such as bravery, fortitude, and perseverance may be better able to experience growth following a traumatic event. Taken together, these findings suggest that motivational and cognitive reappraisal strategies may help promote PTG. Results of the current study extend these results to suggest that effort/perseverance is associated with PTG in OEF-OIF Veterans and that despite having endured war and developed PTSD symptoms, these individuals are capable of making positive changes in their lives and growing from their experience. Prospective studies are needed to further evaluate direct and interactive associations between personality characteristics,

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coping skills, peritraumatic cognitive processing, meaning-making, perceptions of social support, and PTG in OEF-OIF and other Veteran samples.

OEF-OIF Veterans with PTSD scored higher than those without PTSD on measures of total PTG and on two items reflecting aspects of growth related to appreciation of life and personal strength (Tedeschi and Calhoun, 1996). These results are consistent with previous research demonstrating a positive association between PTSD symptoms and PTG (e.g., Park et al., 1996; Snape, 1997; Schorr and Roemer, 2002), as well as a recent studies of Israeli ex-POWs (Solomon and Dekel, 2007) and Vietnam ex-POWs (Feder et al., 2008), which found elevated perceptions of PTG, most notably on ratings of appreciation of life and personal strength (Feder et al., 2008). Taken together, these findings suggest that clinicians treating OEF-OIF Veterans with PTSD should not only monitor PTSD symptoms, but should also be sensitive to and carefully assess positive changes, such as changing of life priorities and feelings of self-reliance, in these individuals. Knowledge of these aspects of PTG is central to positive psychological interventions designed to promote well-being by using individual strengths to improve treatment outcomes (e.g., Fava et al., 2005; Lee Duckworth et al., 2005).

Methodological limitations of this study include a relatively low survey response rate and possible self-selection bias (i.e., respondents who experienced more PTG may have been more likely to complete the survey); potentially limited generalizability of results to white National Guard/Reservist OEF-OIF Veterans; and employment of an abbreviated measure of posttraumatic growth. More research in larger, more representative samples is needed to examine the generalizability of these findings. Despite these limitations, this study is among the first to examine the prevalence and correlates of PTG in OEF-OIF Veterans. Results of this study suggest that the majority of respondents reported significant posttraumatic growth following deployment. They also underscore the importance of developing approaches to bolster unit member support and perceptions of effort and perseverance, as these factors may help enhance growth in this population, even after controlling for demographics, combat exposure, and PTSD symptoms. More research is needed to examine pre-existing personality characteristics and peritraumatic cognitive processing related to PTG, and the effect of preventive and treatment interventions in enhancing PTG and related positive outcomes, such as resilience to traumatic stress, in military personnel.

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Conflict of interest

None of the authors have any conflicts of interest.

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